

M. SC. BOTANY

Programme Outcomes and Course Outcomes

Programme Outcomes (POs):

The M.Sc. - Botany programme is designed to equip students with essential knowledge and technical skills of plants in a holistic manner. Students would be trained in all areas of plant biology using a unique combination of core and elective papers with significant inter-disciplinary components. Students would be exposed to progressive technologies that are currently used in the study of plant life forms, their evolution and interactions with other organisms within the ecosystem. Students would also become aware of the social and environmental significance of plants and their relevance to the national economy.

Programme specific outcomes (PSO's)

PSO1. Students completing the course will be able to understand different aspects of Botany such as Microbiology, Phycology, Mycology, Bryophytes and Pteridophytes.

PSO2. The student completing the course will understand the diversity and phylogeny of the Gymnosperms, Taxonomy of Angiosperms, Cell and Molecular Biology and concepts and processes in Plant Anatomy, Developmental Biology.

PSO3. The students completing the course will be able to identify various life forms of plants, design and execute experiments related to basic studies on ecology, physiology, biochemistry, plant biotechnology, recombinant DNA technology, proteomics and transgenic technology, use of plants as industrial resources or as human livelihood support system.

PSO4. The students completing the course will be capable of executing short research projects incorporating various tools and techniques in any of the basic specializations of Plant Sciences under supervision.

SEMESTER I

Paper –Microbiology

Course outcomes: After the completion of the course the students will be able to

- Characteristic features of Bacteria, basis of five kingdom classification

- Process of isolation and culture bacteria
- Morphology of bacterial cells and viruses
Role of microorganisms in different area.
- Structure, classification, importance & process of reproduction in Lichens.

Paper –Phycology

Course outcomes: After the completion of the course the students will be able to

- Basis of classification
- Types of habitats
- Concept of cyanophage
- Beneficial and harmful activities of algae
- Characteristic features & typed study of all representative genera of each order as per syllabi.

Paper –Mycology

Course outcomes: After the completion of the course the students will be able to

- Characteristic features & basis of classification of fungi
- Process of reproduction
- Evolution and importance of fungi
- General account and typed study of all representative genera from different classes of fungi as per syllabi.

Paper –Bryology and Pteridology

Course outcomes: After the completion of the course the students will be able to

BRYOLOGY

- Evolutionary trends
- Characteristic features
- Economic importance as monitors of mineral deposition,
- Air pollution indicator
- Classification and typed study of all representative genera from different groups as per syllabi.

PTERIDOLOGY

- Origin and basis of classification of Pteridophytes, concept of heterospory and seed habit, stelar system, telome theory
- General account and typed study of representative genera from different classes as per syllabi.
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SEMESTER II

PAPER- GYMNOSPERS AND PALAEOBOTANY

Course outcomes: After the completion of the course the students will be able to

- Understand basis of classification of gymnosperms in detail
- Describe detailed account of Gymnosperms like history, distribution and evolution
- Describe the families of Pteridospermales and Cycadeoideales
- Describe general account of Cordaitales and Pentoxylales
- Describe detailed account of Cycadales, Gingoales and Coniferales
- Understand and describe general informations of Ephedrales, Welwitschiales and Gnetales
- Study and identify fossil forms in Gymnosperms.

PAPER- DIVERSITY AND TAXONOMY OF ANGIOSPERMS

Course outcomes: After the completion of the course the students will be able to

- Discuss the Principles of taxonomy and major systems of classification mainly Bentham and Hooker, Hutchinson and Takhtajan
- Describe ICBN, Plant exploration, Taxonomic tools, Concepts of Phytogeography
- Understand origin of intra-population variation and species concept
- Define origin and evolution of angiosperms
- Distinguish important families described in the syllabus

PAPER- PLANT DEVELOPMENT AND REPRODUCTIVE BIOLOGY

Course outcomes: After the completion of the course the students will be able to

- Understand and define floral morphology, plant adaptation and their morphological nature
- Describe shoot and root Development
- Describe leaf growth and differentiation
- Define general account of plant tissues, root, shoot and leaf anatomy
- Understand and describe anomalous secondary growth in genera described in the syllabus
- Describe development of male and female gametophyte
- Describe pollination, pollen pistil interaction and fertilization
- Describe detailed account of seed development, fruit growth and dormancy

PAPER – X CYTOGENETICS AND PLANT BREEDING

Course outcomes: After the completion of the course the students will be able to

- Apply the concepts of Mendelian genetics to solve problems on linkage, crossing over and gene mapping.
- Analyze human pedigree and apply the principles of population genetics to work out problems on genotype frequency and Hardy-Weinberg equilibrium. Understand the Chromosomal aberrations and their role in genome evolution with special reference to crop plants.
- Understand modern breeding methods in improving agricultural crop varieties.
- Understand the process of cell cycle its regulation and the mechanism of apoptosis.

SEMESTER III

Paper –Plant Ecology

Course outcomes: After the completion of the course the students will be able to

- Environmental factors
- Vegetative organization
- Concept of niche
- Process of ecological succession
- Primary production, energy dynamics
- C, N, P & S biogeochemical cycles
- Biological diversity
- IUCN categories, hot spots etc
Pollution, effect of climate change.

PAPER: PLANT RESOURCE UTILIZATION AND CONSERVATION

Course outcomes: After the completion of the course the students will be able to

- Discuss Basic concepts in sustainable development
- Describe World centers of primary and secondary diversity of domesticated plants
- Define uses of important plants used as food, fodder, fibers, medicinal, aromatic, vegetable oil etc.
- Define important fire-wood, timber yielding plants, NTEPS
- Discuss about green revolution, Avenue trees and Aesthetic value of plants
- Understand and describe conservation of plant biodiversity, strategies for *ex* and *in-situ* conservation

Paper –Biotechnology

Course outcomes: After the completion of the course the students will be able to

- Principle and scope of biotechnology
- Concept of plant cell and tissue culture
- DNA sequencing techniques
- Transgenic plant, alien gene transfer and applications IPR, genomics and proteomics.
- Biological databases.

Paper –Plant Physiology and Biochemistry

Course outcomes: After the completion of the course the students will be able to

- Mechanism of water transport
- Enzymes, Michaelis – Menten equation
- Photosynthesis
- Respiration – Glycolysis etc, PPP
- Nitrogen fixation
- Plant growth regulators
- Photoperiodism and Vernalization
- Stress physiology
- Carbohydrate, Lipids, Alkaloids.

SEMESTER IV

ELECTIVE COURSE

PAPER: PLANT PATHOLOGY

Course outcomes: After the completion of the course the students will be able to

- Describe history of plant pathology in India
- Define inoculums, plant microbe interaction, and genetics of host-parasite interactions

- Discuss dissemination of pathogens, enzymes, toxins involved in disease development, disease resistance, physiology of diseased hosts and disease control
- Understand seed pathology
- Describe structure, importance, disease cycle and control of important diseases
- Describe general account of bacterial, viral and mycoplasmal diseases in plants

ELECTIVE COURSE

PAPER: ETHNOBOTANY, TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY RIGHTS

Course outcomes: After the completion of the course the students will be able to

- Understand the concept, scope and importance of ethnobotany.
- Study the ethnobotany of major tribal communities of Uttarakhand.
- Understand the concepts and implications of Intellectual property rights.